REDACTED -- PUBLIC VERSION, filed 8/2/05

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

VERSUS TECHNOLOGY, INC., Plaintiff,	)	
v.	)	Civil Action No. 04-1231 (SLR)
RADIANSE, INC. Defendant.	)	**CONFIDENTIAL FILED UNDER SEAL**

REPLY BRIEF IN SUPPORT OF RADIANSE'S CONSOLIDATED MOTION TO DISMISS FOR LACK OF STANDING

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Radianse submits this reply to the opposition brief filed by Versus to Radianse's consolidated motion to dismiss for lack of standing.

I. SUMMARY

Versus does little more in its opposition than to: (1) repeatedly assert the over-generalized, but false, conclusion that it possesses "all substantial rights" to the '195 and '791 patents in suit; and (2) argue that Radianse's motion is premature because it is, in effect, a motion for summary judgment filed prior to the completion of discovery and claim construction by the Court. Versus is wrong on both counts. The standing issue raised by Radianse's motion goes to the issue of the jurisdiction of the Court, and should properly be addressed now. If, as Radianse submits, Versus does not hold "all substantial rights" in the patents, then Versus has no right to continue to prosecute this action in its own name. This issue is ripe on the present record, and does not require either further discovery or claim construction.

Moreover, as Versus points out in its opposition brief (Opp. Br. at 8),[1] Alan C. ("Rik") Heller, the president of Freshloc (the current owner of the patents), recently provided documents and deposition testimony in this case. Contrary to Versus' mischaracterization, however, that evidence shows that Freshloc, and its predecessor Precision Tracking FM ("PTFM"), have consistently disagreed with the position Versus urges before this Court regarding the scope of its limited "exclusive" license. Indeed, Versus

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, in effect conceding that it does not own "all substantial rights" to all of Heller's technology that makes

[1] Versus's Opposition To Radianse's Consolidated Motion to Dismiss for Lack of Standing, referenced herein as "Opp. Br. at ___".

any use of IR. Thus, Versus' own prior conduct is directly at odds with its present argument to this Court.

II. FACTS FROM THE HELLER DEPOSITION

The following are additional facts pertinent to the present motion that were learned as a result of the Heller deposition:

1. Prior to January 31, 1997, the date of the Versus license, Heller conceived of a tracking and location system that utilized both infrared (IR) and radio frequency (RF) signals (hereinafter "IR/RF system"). This was in addition to his IR-only based tracking and location systems that are the subject of the Versus license. (Heller Dep., p. 136.)[2]

2. REDACTED

3. Thereafter, Heller and Versus executed the Versus license, as well as an REDACTED both effective as of January 31, 1997. (Heller Dep. Exs. 33A, 33B.)[4]

4. On July 1, 1997, Heller provided to Versus a written disclosure regarding his concept for an IR/RF system. (Heller Dep., p. 141-142; Heller Dep. Ex. 37.)[5]

5. Subsequently, Versus reported to Heller the results of a patent search it had requested directed to a location system utilizing both RF and IR transmitters and receivers. (Heller Dep., pp. 145, 149; Heller Dep. Ex. 39.)[6]

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[2] Transcript of Deposition of Alan C. Heller, July 6, 2005, relevant pages of which are set forth in Exhibit A hereto, and referenced herein as "Heller Dep., p. ___".
[3] Exhibit 36 to Deposition of Alan C. Heller, July 6, 2005, is set forth in Exhibit B hereto.
[4] Exhibits 33A and 33B to the Deposition of Alan C. Heller, July 6, 2005, are set forth in Exhibits C and D hereto.
[5] Exhibit 37 to the Deposition of Alan C. Heller, July 6, 2005, is set forth in Exhibit E hereto.
[6] Exhibit 39 to the Deposition of Alan C. Heller, July 6, 2005, is set forth in Exhibit F hereto.

6. Thereafter, Versus had its own patent counsel prepare a patent application regarding Heller's concept for a combined IR/RF system, and sent it to Heller. Heller felt Versus' demand that he execute the application and assign it to Versus was "more than uncomfortable" and was "wrong." (Heller Dep., pp. 150-151; Heller Dep. Ex. 40.)[7]

7. REDACTED

8. REDACTED

9. The application for an IR/RF system REDACTED was ultimately issued as U.S. Patent No. 6,154,139 (the " '139 patent"). (Heller Dep. Ex. 38.)[9]

10. The '139 patent is for a method and system that utilize both infrared (IR) and radio frequency (RF) to locate subjects within a tracking environment. (*Id.*)

[7] Exhibit 40 to the Deposition of Alan C. Heller, July 6, 2005, is set forth as Exhibit G hereto.
[8] Exhibit 41 to the Deposition of Alan C. Heller, July 6, 2005, is set forth as Exhibit H hereto.
[9] Exhibit 38 to the Deposition of Alan C. Heller, July 6, 2005, is set forth as Exhibit I hereto.

III. ARGUMENT

A. Versus' Rights Under Their License Are Limited

The sequence of events outlined above makes it clear that, from the inception of its "exclusive" license, Versus did not have the exclusive rights that it contends before this Court it has. Versus argues in its opposition brief that "[s]o long as a product employs IR, the fact that it also uses RF is irrelevant. It is within the scope of Versus's exclusive grant." (Opp. Br. at 13). But Versus' licensors, Heller and PTFM, never agreed with Versus' aggrandized view of its rights, and in fact openly and affirmatively disputed it. REDACTED

The evidence from the Heller deposition shows that Heller had the idea for a "dual use technology" tracking system employing both IR and RF prior to the execution of the Versus license.

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Versus' conduct belies the argument it makes before this Court. The reason it REDACTED REDACTED was because it lay outside Versus' exclusive field of use. Thus, it is evident that, while Versus' license may be exclusive within the IR-only field, it does not include all rights to any system that incorporates IR, and in particular does not include a "dual use technology" system that incorporates non-IR (e.g., RF) technology as well.[11]

[10] The IR/RF system REDACTED, while similar to Radianse's system in that it employs dual IR/RF technologies, operated in a specific manner, i.e., by pushing a button on the tag to transmit an RF signal. Radianse's system operates in a different way from the system REDACTED.

[11] The self-serving declaration of Versus' Gary Gaisser deserve little consideration. His contention that Versus would not have entered into an exclusive license for infrared technology products that could be circumvented by the addition of non-infrared technology (Gaisser Decl. at Par. 10), is belied by the facts recounted above. Clearly, Versus got exactly the IR rights it bargained for, and nothing more.

B. Heller Continues To Have Substantial Rights Under The Patents

Versus makes the extraordinary, but false, assertion in its opposition brief that "Versus clearly has all the rights in the licensed patents . . . Freshloc, currently possesses no rights in the licensed patents, except the reversionary right." (Opp. Br. at 8.) While Versus may wish this statement were true, Versus' argument simply defies reality.

Section 1(c) of Versus' license agreement expressly provides that, even as to Heller's technology that is applicable to IR-based applications which is the subject of the Versus' license, Heller (PTFM/Freshloc) retained the right to exploit that technology outside the limited IR-based field. Heller's rights exist now, and are not dependant upon, or have to await, Heller's "reversionary rights." Those reversionary rights, which will return to Heller automatically in 18 months, will give back to Heller the right to fully exploit his technology in the IR-based field as well. But nothing in the Versus license restricts Heller's rights outside that limited IR-based field, even today.

The facts discussed above regarding Heller's IR/RF invention show that Heller has consistently maintained that the Versus license is limited to IR-only. This concept is not "a Radianse invention," as Versus now argues to the Court. (Opp. Br. at 13.) Rather, Versus has known that this is the licensor's view of the limited scope of Versus' "exclusive" license, ever since the inception of the license, and continues to be today. Heller confirmed this in his recent deposition testimony: REDACTED ' (Heller Dep., p. 168.)

The license granted by Heller to Radianse, discussed in Radianse's opening brief, is clear evidence that Heller retains rights in the patents, both currently and prospectively. Heller granted Radianse non-exclusive license rights outside Versus' "exclusive" IR-only field,

effective now, and also granted Radianse non-exclusive rights within the IR-only field, starting in 2007.

In addition, Heller retained the right to sue under the patents that Versus argues were "exclusively" licensed to it. Heller exercised that right in 2003, when Freshloc brought a lawsuit against a company called Wherenet Corporation for patent infringement. (Heller Dep. pp. 167-170; Heller Dep. Ex. 43.)[12] Wherenet was transmitting ID information using RF (i.e., non-IR) electromagnetic radiation. (Heller Dep. 169.) Heller considered this outside the scope of the Versus license. (*Id.*) If, as Versus now argues to the Court, Heller holds only "reversionary rights" in the patents, he never could have brought suit against Wherenet. Again, the facts belie Versus argument to the Court.

C. The Cases Cited By Versus Are Distinguishable On their Facts

Versus argues that, under *Syngenta Seeds, Inc. v. Monsanto Co.*, 2005 WL 984362 (D.Del. March 18, 2005), and *Prima Tek II, LLC v. A-Roo Co.*, 222 F.3d 1372 (Fed. Cir. 2000), the retention of a reversionary right by the licensor, where the license is for less than the full term of the patent, does not deprive the licensee of standing to sue. (Opp. Br. At 5-6.) Once again, Versus is playing fast and loose with the facts.

In *Syngenta*, the licensor granted a patent license in 2002 that was effective until December 31, 2006, and "after that date, may be terminated by either party with not less than ninety days notice." (*Syngenta*, 2005 WL 984362, at FN3.) The patent in suit did not expire until 2011. Thus, the patentee held a potential reversionary interest, but that potential interest would only be realized in the event that the one of the parties terminated the license. That is a far cry from the Versus "exclusive" license, which terminates automatically, according to the express

[12] Exhibit 43 to the Deposition of Alan C. Heller, July 6, 2005, is set forth as Exhibit J hereto.

terms of license, ten years from January 31, 1997. There is nothing "potential" about the reversion to Heller – it is going to happen, without any action by either party.

Prima Tek II, relied on by Versus, is much the same. In *Prima Tek II*, the license at issue terminated prior to expiration of the underlying patent, followed by successive renewable one-year periods. Thus, it was not certain whether the license would, in fact, ever end before the patent expired. The facts in *Prima Tek II* are readily distinguishable from the present case, where there is absolutely no uncertainty about the fact that Versus' "exclusive" license will end in 18 months time, and Heller will recover rights under the patents in the IR-only field. The Federal Circuit in *Prima Tek II* acknowledged that there was no "hard termination," and, therefore, did not present the question raised in *Moore USA Inc. v. Standard Register Co.*, 60 F.Supp. 2d 104, 109-10 (WDNY 1999), which held that a "hard termination date" meant that the exclusive licensee did not have "all substantial rights" under the patent, and lacked standing to sue alone. While Versus argues in its opposition brief that "fundamentally there is no distinction" (Opp. Br. at 10), this is simply wrong. The distinction between reversionary rights that are absolute, and potential reversionary rights that are only *inchoate*, and may never be realized, is not at all trivial.

D. The Standing Issue Is Central To The Court's Jurisdiction

Versus also argues that the issue of standing is "prudential rather than constitutional." (Opp. Br. at 6.) But the fact that the "standing" issue presented by Radianse's motion is statutory in nature, as opposed to "standing" under Article III, does not alter that fact that "standing goes to the heart of the Court's jurisdiction. As explained by this Court in *Syngenta*, *supra* at 2:

> "The question of standing to sue is a jurisdictional one." *Rite-Hite Corp. v. Kelley Co.*, 56 F.3d 1538, 1551 (Fed. Cir. 1995). Standing is a "threshold issue in every federal case, determining the power of the court to entertain the suit." *Warth v. Seldin*, 422 U.S. 490, 498, 95 S.Ct. 2197, 45 L. Ed.2d 343 (1975). Federal courts are under an independent

> obligation to examine their own jurisdiction, and standing "is perhaps the most important of [the jurisdictional] doctrines." *FW/PBS, Inc. v. City of Dallas, 493 U.S. 215, 231, 110 S.Ct. 596, 107 L.Ed.2d 603 (1990).*

Moreover, all of the cases cited by Versus are uniform in their recognition that "standing" in a patent infringement case is only proper for an exclusive licensee if the licensee holds "all substantial rights" in the patent. Here, Versus' rights are expressly limited by the terms of its license to the IR field, and do not extend to non-IR based applications. Versus' licensor has consistently taken the position that Versus' rights are limited, and do not include exclusive rights to "dual use" technology such as IR/RF applications. In addition, Versus' "exclusive" rights are limited in time, and terminate automatically prior to the expiration of the patents in suit. Versus' licensor retains express rights outside the IR-only based field, including the right to sue, and also retains reversionary rights to the IR field upon the expiration of Versus' exclusive term. Based on all these facts, Versus does not possess "all substantial rights" in the patents, and therefore lacks standing to sue. Because the issue of standing goes to the heart of the Court's jurisdiction, this action should be dismissed.

IV. CONCLUSION

For all of the foregoing reasons, as well as those presented in Radianse's opening brief, Radianse submits that its Consolidated Motion to Dismiss for Lack of Standing should be allowed, and this action should be dismissed.

Respectfully submitted,

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By its attorneys,

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EXHIBIT A

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EXHIBIT B

REDACTED

EXHIBIT C

REDACTED

EXHIBIT D

REDACTED

EXHIBIT E

ItL' Jul 1-'97 10:35-NO..004 P.01

VERSUS

2600 Miller Creek Rd
n*m*OH MI49684
PH616-946-5868
FAX 616-946-6775
WWW.versustech.com

Attn: Dave Syrowik Fax: 248-355-3351

Co: Date: 7.11.97

From: Alan "Rik" Heller Pages: 3 (Includes cover)

Re: Versus Technology Patent INFO

☐ Urgent ☐ For Review ☐ Original to Follow ☐ Please Reply ☐ Please Recycle

Notes:

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REDACTED -- PUBLIC VERSION, filed 8/2/05

1-249-353-33 TEL, Dave Syrowik   Jul 1 '97 10:36 No.004 P.02

CONFIDENTIAL

DISCLOSURE ON A MEDIA INDEPENDENT WIRELESS IDENTIFICATION SYSTEM

An identification system exists whereby a single microprocessor can simultaneously receive sensory input with its subcarrier removed and demodulate the data content on each sensory input. In turn each sensory input can come from any number of different sub-carriers. Such sub-carriers include a 40kHz infrared on/off shift key, and a 447.5 kHz infrared on/off shift key.

The ability to be somewhat media independent has assisted in solving different problems in locating technologies. Such problems include the [illegible] IR carrier to a high frequency IR carrier. The use of [illegible] are much less likely to obtain optical interference [illegible] of newer kinds of fluorescent lighting.

[illegible] system is a frequency shift keyed receiver with [illegible] to transmit a 10 b[illegible] transmitter's button is pushed, indicating [illegible] the does have a microprocessor that [illegible] a sensor in this case [illegible] transmits that code to the distant microprocessor in such a way that it looks like a demodulated signal from an IR sensor. This is not necessarily the subject of the patent disclosure but an example of an almost backward compatibility permutation that such a configuration can allow.

The goal now of this invention is to consider the use of multiple media from the same transmitter. The benefits of multiple media are dependent upon the type of media. The two media that are use[illegible] of the preferred embodiments of this disclosure are RF and IR. The benefits of IR are two fold, first [illegible] cost of reception and transmission components are low. Secondly the [illegible] of IR is [illegible] The use of this feature enables the [illegible] that the signal is highly pro[illegible] much more precise location [illegible] fix. [illegible] make this inference [illegible]

The use of RF for precision location creates little benefit as such. However with the additional need of an alarm button on the IR badge, a user must make certain that the badge is line of site when the button is applied. Therefore use of RF obviates this requirement. Further the requirement to have a sensor in every room is obviated and an RF sensor [illegible] per every 10,20 or 30 rooms is reasonable observing current FCC regulation and available low cost RF components. In combination the button press can cause both IR and RF signals to be emitted and a great certainty that the button was depressed is in hand whether or not at that moment an IR signal is seen or not. The [illegible] can then process the last known IR location for [illegible] places where it can be difficult to put IR sensors [illegible] where people may [illegible] The processing software when receiving a button press from [illegible] RF [illegible] to find the last [illegible] the restroom) and hence the proper service can [illegible]

The area of invention and novelty is in the use of the same microprocessor developing the signals into one or both of the emitters (RF oscillator and IR LED). The data modulation routines are identical however the subroutines for the subcarriers may differ. For example a 447.5 khz signal when emitting a carrier ON pulse, will turn the LED on and off for so many microseconds [illegible] 120us) whereas the RF data modulation routine might hold the carrier (oscillator) ON for [illegible] period. Other than that we are using the same processor, the same data modulation and a possible variance to the lowest level routine depending upon media (which pin on the microprocessor you are controlling).

The similar process is reversed at the microprocessor/sensory side. That is, a single microprocessor is used with multiple sensory (receivers) that remove the sub-carrier from the signal leaving the data demodulated serial data. The receiver microprocessor then demodulates the id received. It then passes on the data up stream such that the only relevant information that the signal came from RF [illegible] so [illegible] is only at this time that the system is knowledgeable as to the type of sensor it is (as well as to location).

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In this way a single microprocessor is modulating different simultaneously or staggered. Different sensor sensitive to different media and subcarriers and a single microprocessor demodulate data virtually independent of the media. Data then flows through the system without any knowledge of the data routing components along the way with the final software making expert inferences then knowledgeable as to the media the identification signal came in from.

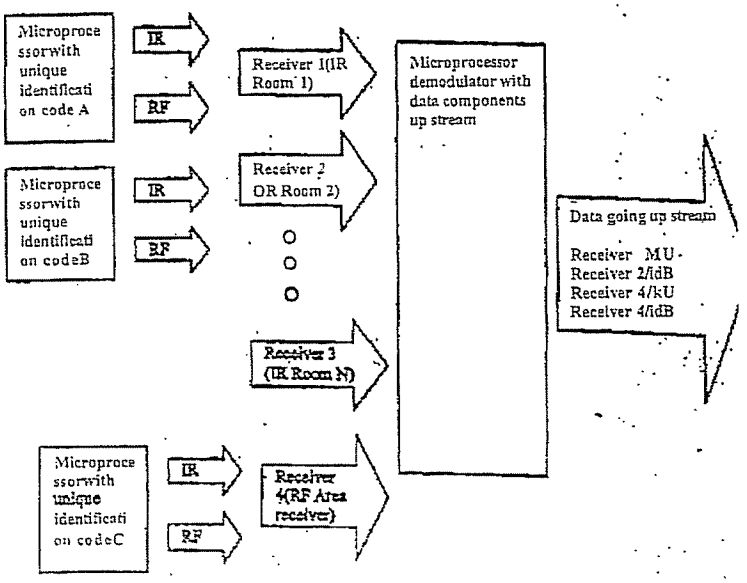

EXHIBIT F

BROOKS & KUSHMAX P. C.
Law Offices

Intellectual Property and Technology Related Causes

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James A. Kushman
David R. Syrowik
Mark A. Cantor
Ralph M. Burton
John A. Artz
Robert C. J. Tuttle

Earl J. LaPennaire
Ronald M. Nabozny
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flagutrad
Patent Agent
Robert C. James

July 23, 1997

Mr. Alan Heller
VERSUS
2600 Miller Creek Road
Traverse City, Michigan 49684

Re: Novelty Search re. Location System Utilizing Radio Frequency and Infrared Transmitters and Receivers
Our File: VERS0109NS

Dear Rik:

We have now received and reviewed the results of a novelty search conducted on the above-noted invention disclosure. In summary, it appears that patent protection is available for your inventive concept.

The search was directed to a location system utilizing both radio frequency (RF) and infrared (IR) transmitters and receivers. Specifically, the search was directed to such a location system wherein IR transmitters and receivers are used to provide a fine determination of the location, and RF transmitters and receivers are used to provide a gross determination of the location of an object. Preferably, the location system is used in hospitals to determine and monitor the location of patients.

The following references were noted during the course of our search, copies of which are enclosed herewith:

Patent No.	Inventor(s)	Patent No.	Inventor(s)
4,462,022	Stolarczyk	4,924,211	Davies
4,982,176	Schwarz	5,218,344	Ricketts
5,228,449	Christ et al.	5,283,549	Mehaffey et al.
5,301,353	Borras et al.	5,416,468	Baumann
5,570,079	Dockery	5,578,989	Pedtke

U.S. Patent No. 5/301,353 to Borras et al. discloses a communication system and apparatus wherein the system utilizes one of two different types of communication methods, depending on the location of the user. When the user is in an on-site area (11)., the user communicates via infrared (17) techniques. When the user is in an off-site area, the user communicates using a different communication media, including an RF communication media.

U.S. Patent No. 5,218,344 to Ricketts discloses a method and system for monitoring personnel in a facility, wherein the system utilizes two different types of communication devices. The system includes a central computer, a plurality of remotely located stationary transceivers, and a portable transceiver unit worn by each monitored individual. In operation, the main computer transmits command signals to a plurality of stationary transceivers using hardwire communication of acoustic, electromagnetic or optical communications. The stationary transceivers then broadcast interrogation signals to the portable transceiver units. The interrogation signals are transmitted via acoustic, electromagnetic or optical transmission methods. The method and system provides a verification of the location of individuals wearing the portable transceiver units.

U.S. Patent No. 5,228,449 to Christ et al. discloses a system and method for detecting out of hospital cardiac emergencies and summoning emergency assistance. The system includes an infrared patient detecting system and an RF communication system. In operation, the infrared system is used to detect the presence and health of the patient. The infrared system provides information to the RF transmitter, which transmits the information to a central computer. The operator of the central computer is then able to monitor the health and presence of the patient via the infrared and radio frequency communication links.

U.S. Patent Nos. 4,924,211 to Davies and 5,416,468 to Baumann disclose systems and methods for monitoring personnel, wherein the systems comprise both infrared and radio frequency communication devices.

The remaining patents are included as references of interest showing security systems using local infrared detecting devices which communicate with a central monitoring station via a radio frequency communication link.

In summary, it appears that patent protection is available for your inventive concept. However, please call me at

BK

your earliest convenience so that we can discuss how to best proceed at this point.

Very truly yours,

BROOKS Jk KUSHMAN P.C.

David R. Syrowik

DRS/jh
Enclosures

cc: Mr. John MacNeal (wo. enc.)

BK

EXHIBIT G

BROOKS & KUSHMAN P. C.
Law Offices

Intellectual Property and Technology Related Causes

February 20, 1998

Mr.. Alan Heller
VERSUS
2600 Miller Creek Road
Traverse City, Michigan 49684

Re: New Patent Application entitled:
Method and System for Locating Subjects
Within a Tracking Environment
Our File: VERS0109PUS

Dear Rik:

On December 17, 1997 we sent you a copy of a first draft of the above-referenced patent application and asked you to review same and send us any corrections you may have. A copy of our December 17th letter is enclosed for your reference.

Please let us have your comments with regard to this application at your earliest convenience so that we can finalize this application and file it in the United States Patent and Trademark Office.

In the meantime, if you have any questions or comments with regard to this matter, please do not hesitate to contact us.

Very truly yours,

BROOKS & KUSHMAN P.C.

David R. Syrowik

DRS/jh
Enclosure
cc: Mr. John MacNeal

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EXHIBIT H

REDACTED

EXHIBIT I

United States Patent [19]
Heller

[11] Patent Number: 5,154,139
[45] Date of Patent: Nov. 28,2000

[54] METHOD AND SYSTEM FOR LOCATING SUBJECTS WITHIN A TRACKING ENVIRONMENT

[75] Inventor: Alan C. Heller, Dallas, Tex.

[73] Assignee: Versus Technology, IVaveise City, Mich.

[21] Appl. No.: 09/063,715

[22] Hied: Apr. 21,1998

[51] Int. a.....G08B 23/00

[52] U.S.CL.....340/573.4; 340/572.1

[58] Field uf Search 340/573.1,573.4, 340/572.1, 311.1.825.44,82534; 379/38

[56] References Cited

U.S. PATENT DOCUMENTS

4,465,022	7/1984	Stolarczyk	340/506
4,906,853	3/1990	Linwood et al.	340/600 X
4,924,211	5/1990	Davits	340/573
4,982,176	1/1991	Schwtrz	340/567
5,017,794	5/1991	tinwood et al.	340A6)0X
5,027,314	6/1991	Linwood et al.	340/573 X
5,119.104	6/1992	Heller	342/450
5,21^344	6/1993	Ricketts	340/573
5,228,449	7/1993	Christ el al.	128A5B1
5,276,496	1/1994	Heller et al,	356/141.
5,283,549	1/1994	Mehaffey et al,	340/521
5,301,353	4/1994	Boms et al.	340/539 X
5,355,222	10/1994	Heller et al.	356/375
5^81^48	1/1995	Richmond	340/82536
5,387,993	271995	Heller cl al.	359/155
5,440,559	8/1995	Caskrll	340/825.34 X
5,465,082	11/1995	Chaco	340/825.54
5,548,637	8/1996	Heller etaL	379/201
5,570,079	10/1996	Dockery	340/541
5,572,195	11/1996	Heller clal.	34CVK2535
5,578,989	11A996	Pnffler	34CVS59
5^10^89	3/1997	Evans el aL	340/573.1
5,673,032	9/1997	Ozo	340/825.44

Primary Examiner—*Thonns* Mullen
Attorney, Agent, or Firm—Brooks & Kushman P.C

[57] ABSTRACT

A method and system utilize both the radio frequency (RF) and infrared (&) parts of the electromagnetic spectrum to locate subjects (i.e. objects and persons) within a tracking environment The system includes a battery-operated, microprocessor-based badge for each subject to be located. Each badge automatically transmits digitized infrared light signals to provide a fine determination of its subject's location. Each badge transmits RF and IR signals upon actuation of a page request/alert push button switch on its badge. An RF signal is also generated at a timed interval as a "heartbeat" pulse. This pulse informs the host computer that the badge is both present and fully functional. The IR and RF signals are modulated or encoded with badge identification data, page request or alert notification data, and battery condition data. The system also includes ceiling, or wall sensors in the form of IR and RF receivers. Each RF sensor converts the encoded RF signals into a first set of electrical signals. Each IR sensor converts encoded IR signals into a second set of electrical signals. In turn, the first and second sets of electrical signals are transmitted to a microprocessor-based collector of the system. The locating method and system are particularly useful in hospitals to determine and monitor the location of patients and/or critical equipment.

12 Claims, 1 Drawing Sheet

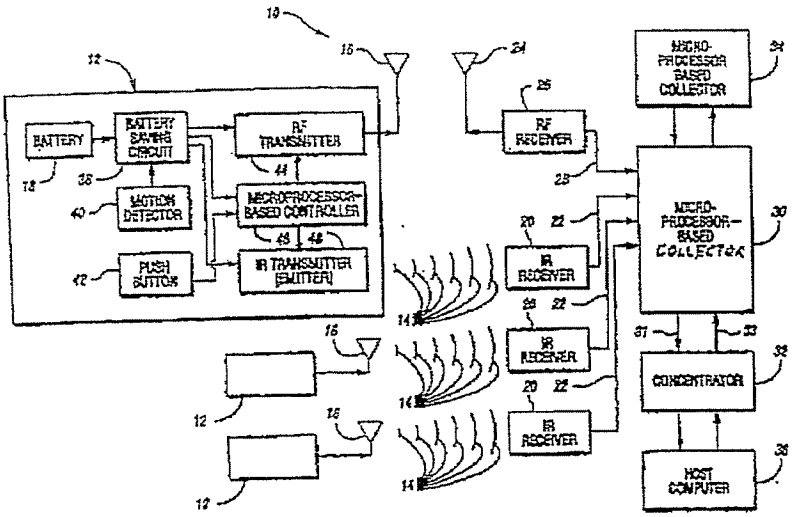

Exhibit C

EXHIBIT NO. 38
JACK B. BLUMENFELD

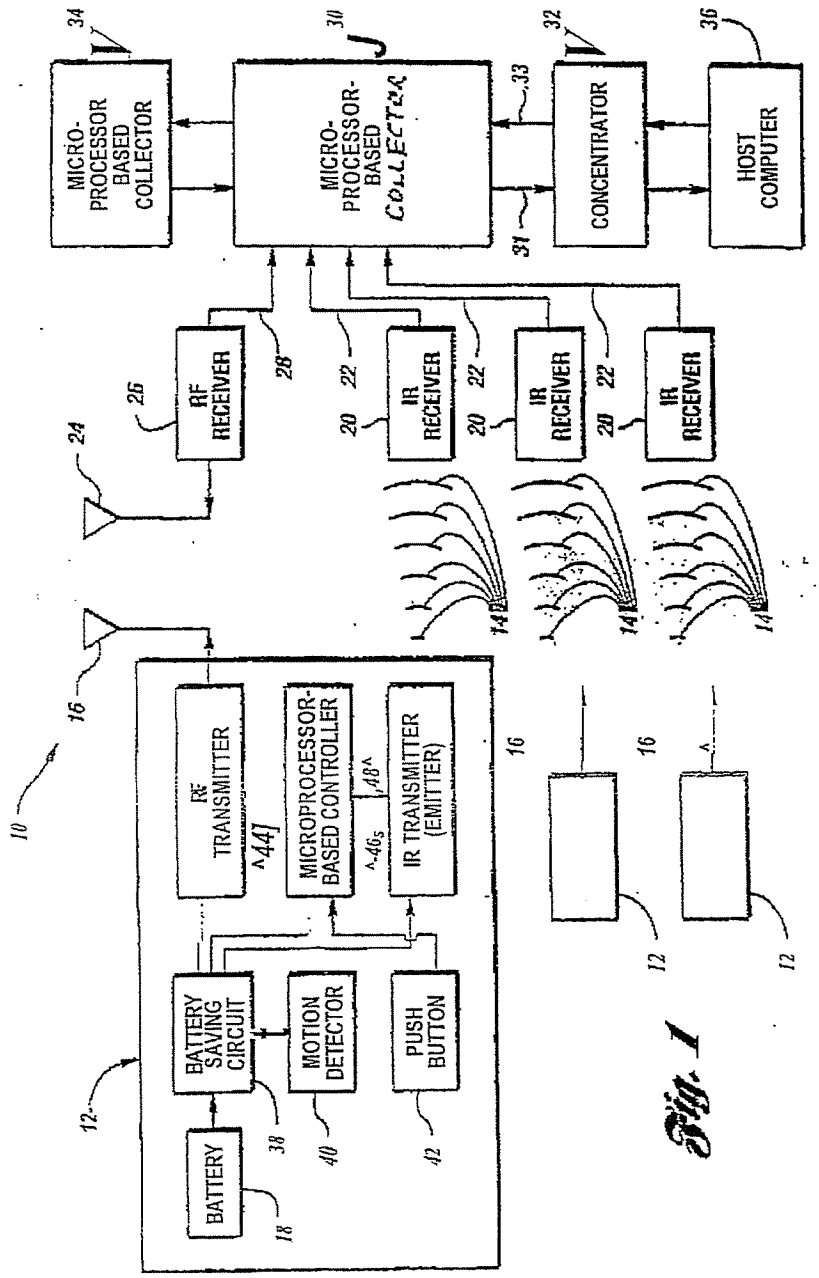

Fig. 1

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METHOD AND SYSTEM FOR LOCATING SUBJECTS WITHIN A TRACKING ENVIRONMENT

TECHNICAL FIELD

This invention relates to methods and systems for locating subjects within a tracking environment and, in particular, for methods and systems for locating subjects within a tracking environment wherein the system includes a tag for each subject to be located.

BACKGROUND ART

An identification system exists whereby a single microprocessor can simultaneously receive sensory input with its subcarrier removed and demodulate the data content on each sensory input. In turn, each sensory input can come from any number of different subcarriers. Such subcarriers include a 40 kHz infrared on/off shift key, and a 447.5 kHz infrared on/off shift key.

IT* ability to be somewhat media independent has assisted in solving different problems in locating technologies. Such problems include the changing from a low frequency IR carrier to a high f^en^IR carrier. The use of higher fre^nc*m^ (... 447.5 KHz receivers) are much less likely to obtain (... terference signals caused by the use of newer lands of flnorescent lighting.

Further use of other subcarriers used with this type of system is a frequency shift keyed:<FSK)^receiver with appropriate transmitter whose spk,potubined purpose is to transmit a 10 bit identification code when the transmitter's button is pushed, indicating a special event the user wishes to create. The sensor in this case has a microprocessor that completely demodulates the FSK received code and retransmits that code to a distant microprocessor in such a way that it looks like a demodulated signal from an IR sensor.

U.S. Pat. No. 5,301,353 to Borras et al. discloses a communication system and apparatus wherein the system utilizes one of two different types of communication methods, depending on the location of the user. When the user is in an on-site area, the user communicates via infrared techniques. When the user is in an off-site area, the user communicates using a different communication media, including an RF communication media.

U.S. Pat. No. 5,218,344 to Ricketts discloses a method and system for monitoring personnel in a facility, wherein the system utilizes two different types of communication devices. The system includes a central computer, a plurality of remotely located stationary transceivers, and a portable transceiver unit worn by each monitored individual. In operation, the main computer transmits command signals to a plurality of stationary transceivers using hardwire communication of acoustic, electromagnetic or optical communications. The stationary transceivers then broadcast interrogation signals to the portable transceiver units. The interrogation signals are transmitted via acoustic, electromagnetic or optical transmission methods. The method and system provides a verification of the location of individuals wearing the portable transceiver units.

U.S. Pat. No. 5,228,449 to Christ et al. discloses a system and method for detecting out-of-hospital cardiac emergencies and summoning emergency assistance. The system includes an infrared patient detecting system and an RF communication system. In operation, the infrared system is used to detect the presence and health of the patient. The infrared system provides information to the RF transmitter, which transmits the information to a central computer. The operator of the central computer is then able to monitor the health and presence of the patient via the infrared and radio frequency communication links*

U.S. Pat. Nos. 4,924,211 to Davies and 5,416,468 to Baumann disclose systems and methods for monitoring personnel, wherein the systems comprise both infrared and radio frequency communication devices,

U.S. Pat Nos. 4,462,022; 4,982,176; 5,570,079; 5,283,549; and 5,578,989 show security systems using local infrared detecting devices which communicate with a central monitoring station via a radio frequency communication link.

U.S. Pat. No. 5,027,314 discloses a system and method for tracking a number of subjects in a plurality of areas. The system includes a plurality of transmitters associated with the subjects, a plurality of receivers associated with the areas and a centralized processor for determining in which of the areas the transmitter and, consequently, the subjects are located.

Each transmitter transmits a light-based signal, such as an Mirts^rtvtesuntiocotin identifying code unique ... to the ^^ Each receiver validates the signal to determine ^^ ^ a ^ are ... ^^ ... associated with the transmitters. 'IT* centralized processor records the validated signals and ^ ^ ... ^ ^ ... ^ and accumulates ^ and badge ^^ for each ^.

U.S. Pat No 5,54^537 discloses an automated method and system for providing ^ location of a person or object ... ^^ in ^ form of a message in ^ ^ ^ ^ ... caller's inquiry. The method and system may connect ... ^^ directly ... ^ a j ^ ^ * extension ... nearest the ^ j ^ of interest. A transmitter, such as an infrared transmitter, is attached to each subject to be monitored ^j^ a defined ^ such as a building. A number of receivers or sensors track the location of the subject within the building. The locations are stored in a database. In one form of the invention, as each transmitter is transported throughout the building, the system continually updates the transmitter location in the database,

U.S. Pat. No. 5,572,195 discloses a method and system for tracking and locating objects wherein the system includes a computer network, such as a local area network, a computer connected to the computer network, infrared sensors, and interface circuitry connecting the computer network to the infrared sensors. The infrared sensors are adapted to receive unique identifying codes from infrared transmitters and then provide the codes to the interface circuitry. In turn, the codes are then provided to the computer network. The invention may be implemented using an object identifier variable-based protocol such as SNMP (Simple Network Management Protocol). The system may include an external device controller, such as a relay controller, for controlling a physical device such as an electronic door lock within the environment

U.S. Pat No. 5,387,993 discloses various methods of transmitting data and control information such as battery life for badges (TAGs) to optical (i.e. infrared) receivers of an optical locator system. In one of the methods, the badges are "motion-detectabl" and have a sleep mode. The badges are reprogrammable with identifying information about the objects to which they are attached. Each badge activates the sleep mode, thereby reducing its normal power consumption. Each TAG will reactivate the sleep mode when motion is detected by the motion detector, thereby returning the battery power level to normal.

VS. Pat. No. 5,119,104 discloses a radio-location system for muMpath environments, such as for tracking objects in a facility, include* an array of receivers distributed within the tracking area, coupled to a system processor over a LAN. A TAG transmitter located with each object transmits, at selected intervals, spread spectrum TAG transmissions including at least a unique TAG ID. Object location is accomplished by time-of-arrival (TOA) differentiation, with each receiver including a TOA trigger circuit for triggering on arrival of a TAG transmission, and a time base latching circuit for latching the TOA count from an 800 MHz time base counter. In a low resolution embodiment, each receiver of the array is assigned a specific locata-area, and receives TAG taiisnmaly from TAGs located in that area, thereby eliminating the need for any time-of-arrival circuitry.

U.S. Pal. No. 5,276,496 discloses an optical receiver for use with an optical location system that locates a target in a defined area. A spherical lens is placed over the area. The area is divided into sections, with a sensor associated with each section. These sensors receive light transmitted through the lens, and are positioned relative to each other and with respect to (he lens, such that each sensor receives emitted light from the same size section if the target is located in its section. The height of each sensor may be adjusted so that each sensor receives light of the same intensity if the target is located in its section.

U.S. Pat. No. 5^55,222 discloses an optical location system for locating Ihe pojgtion pC'§ moyjmj object in a defined area. An optical transmitter is attached to the moving object. A stationary receiver has a number of sensors for receiving a signal from the transmitter. one sensor has a field of view of the entire area, other sensors have partially blocked fields of view, with the blocking being accomplished with nonopaque strips of decreasing width. These strips are arranged so that the detection or nondetection of light by the sensors can be digitally coded in a manner that corresponds to sections of the area.

U.S. Pat. No. 4,906,853 discloses a control apparatus for triggering a periodic pulse at random times comprising a timer for variably issuing the periodic pulse in a defined time cycle and a signal generator for variably generating an output voltage within the defined cycle. The signal generator has a light sensitive component for varying in time the generation of the output voltage in proportion to the intensity of visible light incident on the light sensitive component. The apparatus also includes a circuit for applying the generated output voltage to the timer for triggering the issuance of the periodic pulses.

U.S. Pat. No. 5,017,794 discloses apparatus including a time for generating a periodic pulse in a defined time cycle in response to a control signal, and a signal generator for variably generating the control signal within the defined cycle. The signal generator includes a light sensitive component for varying in time the generation of the control signal in proportion to the light incident on the light sensitive component for a portion of the defined cycle.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a method and system for locating subjects wherein the system includes a TAG for each subject to be located and wherein each TAG emits or transmits substantially line-of-sight and substantially non-line-of-sight signals. The signals in the preferred embodiment are RF and IR. The benefits of IR are two-fold, firstly, the cost of reception and transmission components

are low. Secondly, the benefit of IR is its high line-of-sight nature. The use of this feature enables processing software to infer that the signal is highly proximate (line-of-sight or almost line-of-sight) to the transmitter. The ability to make this inference creates a much more precise location Ox.

The use of RF obviates the requirement that a badge or TAG is line-of-sight when a push button of the TAG applied is pushed. Further, the requirement to have a sensor in every room is obviated and an RF sensor that receives button presses per every 10, 20 or 30 rooms is reasonable observing current FCC regulation and available low cost RF components.

j ^ ^ object of the present b^Htm is to provide a method and system forlecatmg subjects wherein the system includes a TAG for ^ ^ j ^ to ^ j ^ ; ^ and y^ein each TAG ^dudes a push button lhal causes RF signals to be emitted and a great certainty that the push button depressed is in the hands of a user whether or not at that moment the IR signal is seen. Hie processing software can then process the last known IR location for purposes of servicing the person who has pressed the push button,

Bathrooms are places where it can be difficult to put IR sc^^ and ^^ p^fe may a 5 e ^ being pressed ^ processing software when receiving a button press from the RF sensor <t, proceed to find the last known g ^, reception (^^ w^ Kkely be outside the restroom) and hence the proper service can then be delivered to the person who pressed the push button.

Still another object of the present invention is to provide method and system for locating subjects wherein the system includes a TAG for each subject to be located and wherein the TAG includes a single microprocessor which substantially develops the signals into both emitters or transmitters (RF oscillator and IR LED). The data modulation routines are substantially identical. However, the submatte* for the subcarriers may differ. For example, a 447.5 kHz signal when emitting a carrier ON pulse, will turn the IR LED on and off for ^ many microseconds (typically 120 us) whereas the RF data modulation routine might hold the carrier (i.e. oscillator) ON for the entire period.

The process is reversed at the microprocessor/sensory side. That is, a single microprocessor is used with multiple sensors (i.e. receivers) that remove the subcarrier from the signal leaving the data as demodulated serial data. The receiver microprocessor then demodulates the ID received, it then passes on the data upstream such that the only relevant information that the signal came from RF or IR is determined by the software when the sensor is programmed into the system. This is referred to at setup or installation. It is only at this time that the system is knowledgeable as to the type of sensor it is (as well as its location).

In this way, a single microprocessor is modulating different signals simultaneously or staggered. Different sensors sensitive to different media and subcarriers and a single microprocessor demodulate data virtually independent of the media. Data then flows through the system without any knowledge of the data routing components along the way ^ ^ ^ ^ ^ makes ^ inferences then knowledgeable as to the media the identification signal came in from.

In carrying out the above objects and other objects of the present invention, a method is provided for locating subjects within a tracking environment The method includes the steps of providing, for each subject, a TAG for transmitting both a substantially line-of-sight signal including a unique TAG ID and a substantially non-line-of-sight signal also

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including the unique TAG ID. An array of receivers distributed within the tracking environment is also provided, wherein the array of receivers includes an extended area receiver for receiving a plurality of substantially non-line-of-sight signals and a plurality of limited area receivers. Each of the limited area receivers receives substantially line-of-sight signals. An extended area detection packet is generated including the unique TAG ID in response to each received non-line-of-sight signal. The method further includes the step of generating a limited area detection packet including the unique TAG ID in response to each received line-of-sight signal. Finally, the method includes the step of determining the location of each TAG and its associated subject based on the identity of the extended area and limited area receivers for the TAG as represented by its extended area and limited area detection packets.

Preferably, the line-of-sight and non-line-of-sight signals are electromagnetic transmissions such as radio frequency signals and infrared signals.

The above objects and other objects, features, and advantages of the present invention are readily apparent from the following detailed description of the best mode for carrying out the invention when taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWING FIGURE

FIG. 1 is a schematic block diagram illustrating the method and system of the present invention.

BEST MODE FOR CARRYING OUT THE INVENTION

Referring now to FIG. 1, there is illustrated a system, generally indicated at 10, for locating subjects (i.e. persons and objects) in a tracking environment. In general, the system is a combined infrared and radio frequency locating system which is adapted for use not only in medical applications, but also in non-medical applications. The system 10 is a fully automatic data collection system which provides real-time location information of personnel [illegible] in-wall sensor network connected with common telephone-type wire to make accurate decisions and execute the appropriate responses. Typically, the components of the system 10 are relatively simple and modular.

In general, the system 10 includes a plurality of TAGs or badges, each of which is generally indicated at 12. Each badge 12 is provided for each subject to be tracked within the tracking environment. In general, each badge emits a hemisphere of digitally encoded infrared (i.e. IR) light as indicated by lines 14. Preferably, the digitally encoded infrared light includes a 42 bit packet having a fixed 16 bit ID plus other network information. Typically, the effective range of such infrared light is approximately 15 to 18 feet. The infrared light is a substantially line-of-sight signal.

Each badge 12 also transmits or emits a radio frequency (i.e. RF) signal via an antenna 16. The digitized infrared light and the radio frequency interface contain badge identification data, page request or alert notification, and condition of a battery 18 contained within each of the badges or TAGs 12.

An RF signal is also generated at a timed interval as a "heartbeat" pulse. This pulse informs the host computer that the badge is both present and fully functional.

The system 10 also includes a receiver assembly including a plurality of infrared receivers 20 which are utilized to receive the badges' infrared signals and transmit coded transmission data along twisted pair connections 22.

The radio frequency signals emitted by the antennas 16 are received by an antenna 24 of a radio frequency receiver 26 which comprises a sensor having a range of approximately 100 to 200 feet in all directions. The radio frequency receiver 26 converts encoded signals emitted by the badges or transmitters 12 into electrical signals which are transmitted via a single twisted pair connection 28.

The signals appearing along the connection 28 as well as the connections 22 are received by a micro-processor-based collector 30 of the receiver assembly which takes the incoming data packets, buffers them and prepares them for [illegible] to a concentrator 32 of the system 10. The collector 30 assembles data received from the receivers 20 and 26 into a larger network-ready packet. This network-ready packet is then relayed along a twisted wire pair 31. Typically, software for the collector 30 is uploaded via the concentrator 32 along a connection 33. Typically, the microprocessor-based collector 30 can be connected to up to 24 sensors or receivers such as the receivers 20 and the receiver 26.

The concentrator 32 typically scans the collector 30 as well as any other collectors such as a collector 34 connected in a single daisy chain or multidrop configuration to the concentrator 32. In turn, the collector 34 is connected to [illegible] of the [illegible] and RF [illegible] [illegible] appropriately programmed host computer 36 which receives and processes data packets collected by the concentrator 32.

Referring in detail now to the badges, the topmost badge 12 of FIG. 1 typically includes the battery 18 which may [illegible] includes a battery-saving circuit 38 connected to the battery [illegible] and to a motion detector 40 wherein IR transmissions from [illegible] badge [illegible] are [illegible] at a higher frequency when the badge is in motion and are gradually reduced in frequency when the badge 12 is at rest to preserve battery [illegible]. Each badge 12 also includes a push b[illegible] [illegible] [illegible]able and can be used [illegible] [illegible] [illegible] frequency transmitter 44 under [illegible] microprocessor-based controller 45. [illegible] transmissions from the [illegible] specific [illegible] signals [illegible] do not penetrate walls or floors, the radio frequency signals transmitted or emitted by the radio frequency transmitter 44 under the control of the controller 46 do penetrate walls and floors. The radio frequency transmitter 44 produces supervisory signals approximately every two minutes and page request/alert signals substantially instantaneously upon depression of the push button 42.

A microprocessor-based controller 46 controls the RF transmitter 44 to modulate data including preset, unique identification codes (i.e. TAG ID). For example, a radio frequency data modulation routine provided by the controller 46 typically holds an oscillator contained within the RF transmitter 44 on the entire period the push button 42 is depressed. Preferably, the RF transmitter 44 under the control of the controller 46 uses frequency shift keyed modulation.

In like fashion, an IR transmitter or emitter 48 of the badge 12 under control of the controller 46 modulates the IR transmissions from the transmitter 48. For example, a 4475 kHz signal, when emitting a carrier on pulse, will turn the

LED of the transmitter 48 on and off for so many micro* seconds (typically 120 microseconds).

The RF receiver 26 typically uses modulating current bop transmission signaling technology for high reliability. Typically, the receiver 26 can be located up to 1,000 feet from its associated collector 30 using standard unshielded twisted pair telephone-type wire. While the receiver 26 and the receivers 20 are typically mounted in acoustic tile, they may be also mounted on walls or other convenient locations.

The modulation process provided for each badge 12 by its controller 46 is reversed within each micro-processor-based collector 30. Each collector 30 removes the subcarrier from the signals appearing on connections 28 and 22, thereby leaving the data as demodulated serial data. The microprocessor within the collector 30 then demodulates the ID data received. It then passes this data upstream such that the only relevant information that the signal came from a radio frequency receiver such as the radio frequency receiver 26 or an infrared receiver such as one of the infrared receivers 20 is determined by the software contained within the host computer 36 when the particular receivers 26 and 20 are programmed into the system 10. Not only is the system 10 knowledgeable as to the type of receiver the data is received from, but also its location.

Typically, the host computer 36, when appropriately programmed, can process the last known infrared location for purposes of servicing a person who has pressed a push button 42 on his associated badge 12. For example, since bathrooms are places where it can be difficult to place infrared receivers 20 and where people may object to such a receiver being present, a push of the push button 42 by a person within such a bathroom will require the host computer 36 to find the last known infrared receiver reception (which is likely to be outside the restroom). Hence, the proper service can be delivered to the person who pressed the push button 42.

While the best mode for carrying out the invention has been described in detail, those familiar with the art to which this invention relates will recognize various alternative designs and embodiments for practicing the invention as defined by the following claims.

What is claimed is:

1. A method for locating subjects within a tracking environment, the method comprising the steps of:

for each subject, providing a TAG capable of transmitting a substantially line-of-sight signal including a unique TAG ID substantially simultaneously with a substantially non-line-of-sight signal also including the unique TAG ID;

providing an array of receivers distributed within the tracking environment, wherein the array of receivers includes an extended area receiver for receiving a plurality of substantially non-line-of-sight signals and a plurality of limited area receivers, each of the limited area receivers receiving substantially line-of-sight signals;

generating an extended area detection packet including the unique TAG ID in response to each received non-line-of-sight signal;

generating a limited area detection packet including the unique TAG ID in response to each received line-of-sight signal; and

determining the location of each TAG and its associated subject based on the identity of the extended area and limited area receivers for the TAG as represented by its extended area and limited area detection packets.

2. The method of claim 1 wherein the line-of-sight and non-line-of-sight signals are electromagnetic signals.

3. The method of claim 2 wherein the non-line-of-sight signals are radio frequency (RF) signals and the extended area receiver is an RF receiver.

4. The method of claim 3 wherein the line-of-sight signals are infrared (IR) signals and the limited area receivers are IR receivers.

5. A system for locating subjects within a tracking environment, the system including:

for each subject, a TAG capable of transmitting a substantially line-of-sight signal including a unique TAG ID substantially simultaneously with a substantially non-line-of-sight signal also including the unique TAG ID;

a receiver assembly including an array of receivers distributed within the tracking environment, wherein the array of receivers includes an extended area receiver for receiving a plurality of substantially non-line-of-sight signals, the receiver assembly generating an extended area detection packet including the unique TAG ID in response to each received non-line-of-sight signal, the array of receivers also including a plurality of limited area receivers, each of the limited area receivers receiving substantially line-of-sight signals, the receiver assembly generating a limited area detection packet including the unique TAG ID in response to each received line-of-sight signal;

a data communications controller coupled to the receiver assembly for collecting the extended area and limited area detection packets; and

a location processor coupled to the controller for receiving the collected detection packets and for determining the location of each TAG and its associated subject based on the identity of the extended area and limited area receivers for the TAG as represented by its extended area and limited area detection packets.

6. The system as claimed in claim 5 wherein the line-of-sight and non-line-of-sight signals are electromagnetic signals.

7. The system as claimed in claim 6 wherein the non-line-of-sight signals are radio frequency (RF) signals and the extended area receiver is an RF receiver.

8. The system as claimed in claim 7 wherein the line-of-sight signals are infrared (IR) signals and the limited area receivers are IR receivers.

9. The system as claimed in claim 8 wherein each TAG includes an RF transmitter for transmitting its RF signal, an IR transmitter for transmitting its IR signal and a single controller for controllably modulating both the RF and IR signals with its unique TAG ID.

10. The system as claimed in claim 9 wherein the single controller is a microprocessor-based controller.

11. The system as claimed in claim 8 wherein the receiver assembly includes a collector coupled to the RF and IR receivers for controllably demodulating the received RF and IR signals to obtain the extended area and limited area detection packets.

12. The system as claimed in claim 11 wherein the collector includes a single microprocessor for controllably demodulating the received RF and IR signals.

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CERTIFICATE OF SERVICE

I, Josy W. Ingersoll, Esquire, hereby certify that I caused copies of the foregoing document to be served on July 18, 2005 on the below listed counsel in the manner indicated:

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